In order to maximize returns, a minimum amount of fertilizer should be supplied with each seed lot. The rule of thumb for irrigated areas, without additional information, is to apply two units of nitrogen and one unit of phosphorus. The recommended levels should be 80-100 kilograms of nitrogen and 40-50 kilograms of P_2O_5 per hectare with adequate irrigation. If irrigation is limited the fertilizer recommendation should also be scaled down in appropriate fashion. Under rainfed conditions the rule of thumb is to apply one nitrogen to each unit of phosphorus, or 15-20 kilograms of each per hectare. It should be stressed that these are elemental units of the fertilizer and not weight units.

The issue of seed treatment has been debated and opinion is divided between those recommending treatment and those suggesting no treatment. There are an number of factors to be considered with this recommendation.

One possible solution would be to include a package of seed treatment chemical, such as vitavax, with the package of seed and fertilizer. The chemical is safe by mammalian standards and it is effective against those diseases important to Afghan farmers. This treatment will eliminate the seed borne disease known as loose smut and protect against infection from bunt disease. These diseases can survive either on/in the seed or in the soil. Other soil fungi are also controlled by the treatment.

There may be some reasons to delay seed treatment until just before the farmer sows. There is always a chance that some will be consumed accidently or maybe even on purpose. Treatment and dye would tend to discourage eating and other unscrupulous activities. The treatment of seed to control consumption verses the possible association of chemical intake if eaten is a judgement value decision.

Another alternative is to treat the wheat seed at some staging area just before it is sent to Afghanistan. This will reduce the chances for damage from long exposure to the chemical, and may discourage diversion of seed to commercial channels. However, this procedure would require some organization and technical supervision.

A point to consider is the fact that untreated seed exposed to high temperature and/or high moisture will lose viability over time. The longer this interaction is sustained the more adverse effect there will be on germination. Under ideal conditions this problem may not arise but this is very unlikely with the current circumstances. Finally, if the seed is not lifted, it must be stored until next season. The duration is sufficiently long that chemical treatment and unfavorable conditions are bound to reduce germination to some extent.

There are technical details, coordination of events and constraint of time that will need to be synchronized. This will require the attention of a knowledgeable person full time. Even one person may not be sufficient, but a technical coordinator or team leader for the seed procurement, production, processing, maintenance, and distribution of stocks appears to be justified. Additional technical assistance or back stopping can probably be arranged using consultants on a need basis. Some pre-arranged or scheduled consulting may be desirable at an early date.

Intermediate Considerations:

At the heart of the food for Afghanistan issue is the need for good seed. This need is most immediate for the coming wheat crop but, over time, the projected requirements will increase and extend to other crops. Similar operations will need to be considered and where applicable integrated to maximize benefits and reduce costs.

The initial quantities of seed purchased represents a small portion of the total required. When the tempo of returning refugees increases, the demand for wheat seed and commodities will increase commensurately. Plans for this demand and the development of a nucleus seed industry for Afghanistan should be considered. This could be initiated in a joint venture project in Pakistan until such time that it could be shifted to Afghanistan. This could benefit the cool areas of North West Frontier Province (NWFP) and Baluchistan and Afghanistan simultaneously.

The need for quality seed at all levels is paramount. The process of initiating the process should receive high priority. The lack of a seed production capacity has often hindered development and withheld benefits to the farmer. It is a recognized bottle neck to development. The seed process seems to suffer lack of support despite the fact that it a vital link between research and extension. It is certainly deserves more attention then it now receives.

Longer Term Considerations:

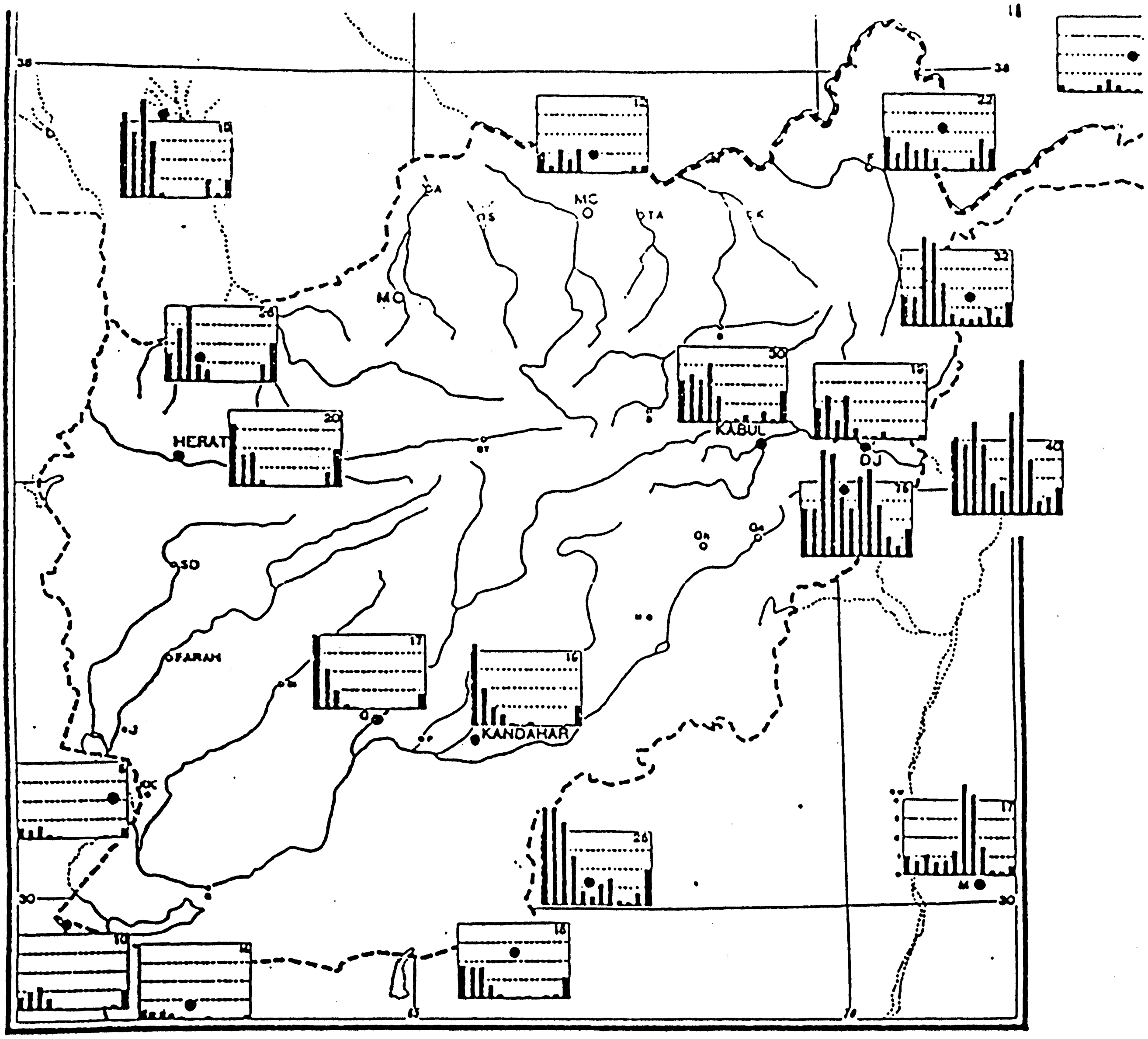
A re-building of the Afghanistan agriculture research capacity will be required and it will be a long difficult task. A start on developing research capacity could be accomplished as a joint venture with the Pakistan Agricultural Research Council and/or Provincial Agricultural Research Institutes of the NWFP and Baluchistan.

A strong start could be made with wheat adaptative research trials and early generation seed production. Wheat would be a logical crop to initiate the process and other crops could be added as experience was gained. The staging of an agriculture research basis which could be transferred at an appropriate time could result in major benefits for the Afghanistan agricultural sector. The International Agricultural Research Centers are possible sources of technology. They could either assist or backstop some of the activities and provide training opportunities in some areas (See Annex7).

Recommendations

See Summary of Recommendations or text.

Annex No. 1. Rainfall diagrams of some meteorological stations in Afghanistan and adjacent areas (taken from General Atlas of Afghanistan, 1978).



Diagrams of rainfall at some meteorological stations in Afghanistan and neighbouring territories

Diagrammes des chutes pluviales d'un certain nombre de stations météorologiques en Afghanistan et dans des territoires voisins

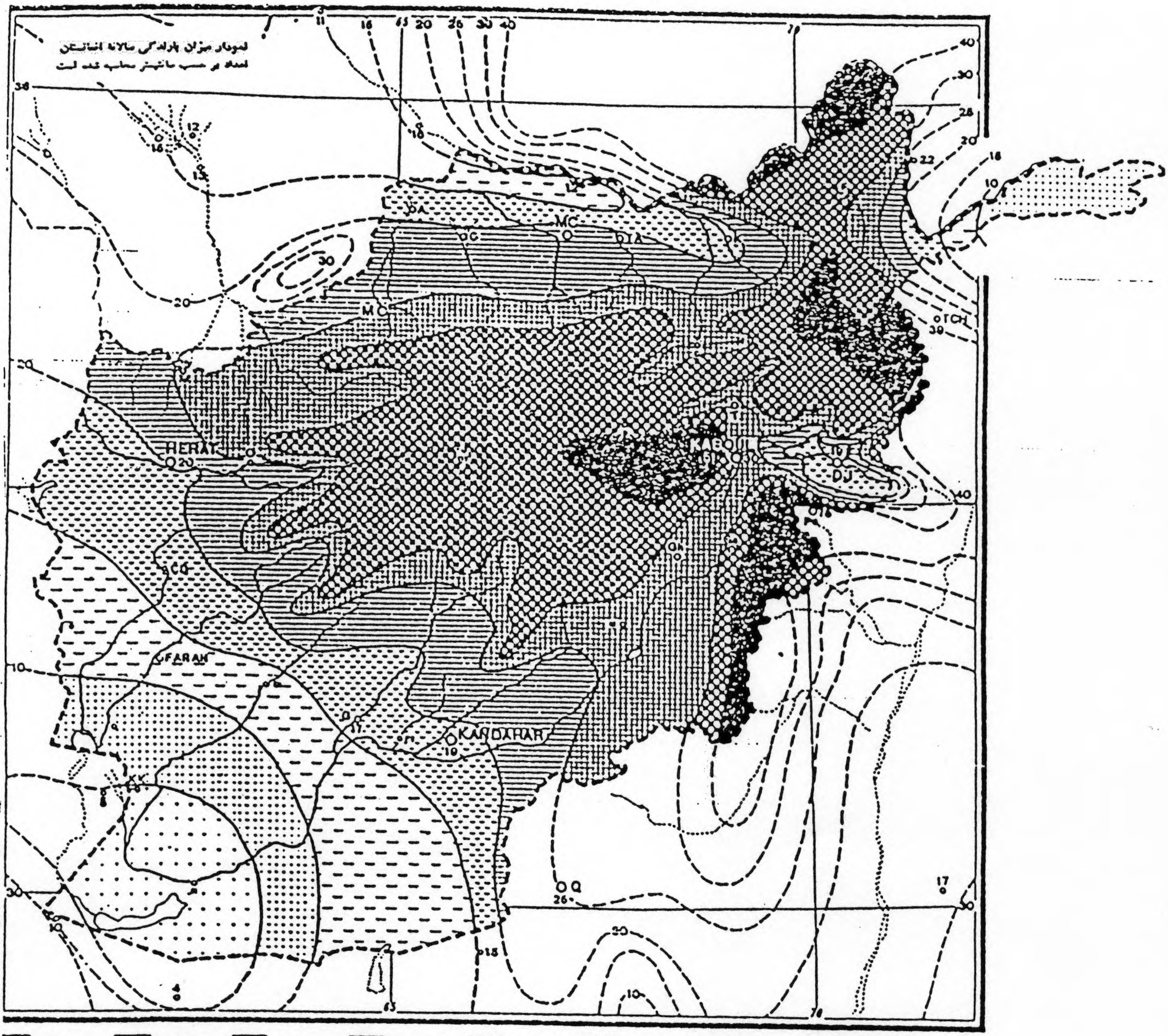
نمودار میزان بارندگی

[illegible]

Climatic table of some towns of Afghanistan

[illegible]

Annex No. 2. Isochronal lines for annual rainfall in Afghanistan (taken from General Atlas of Afghanistan, 1978).

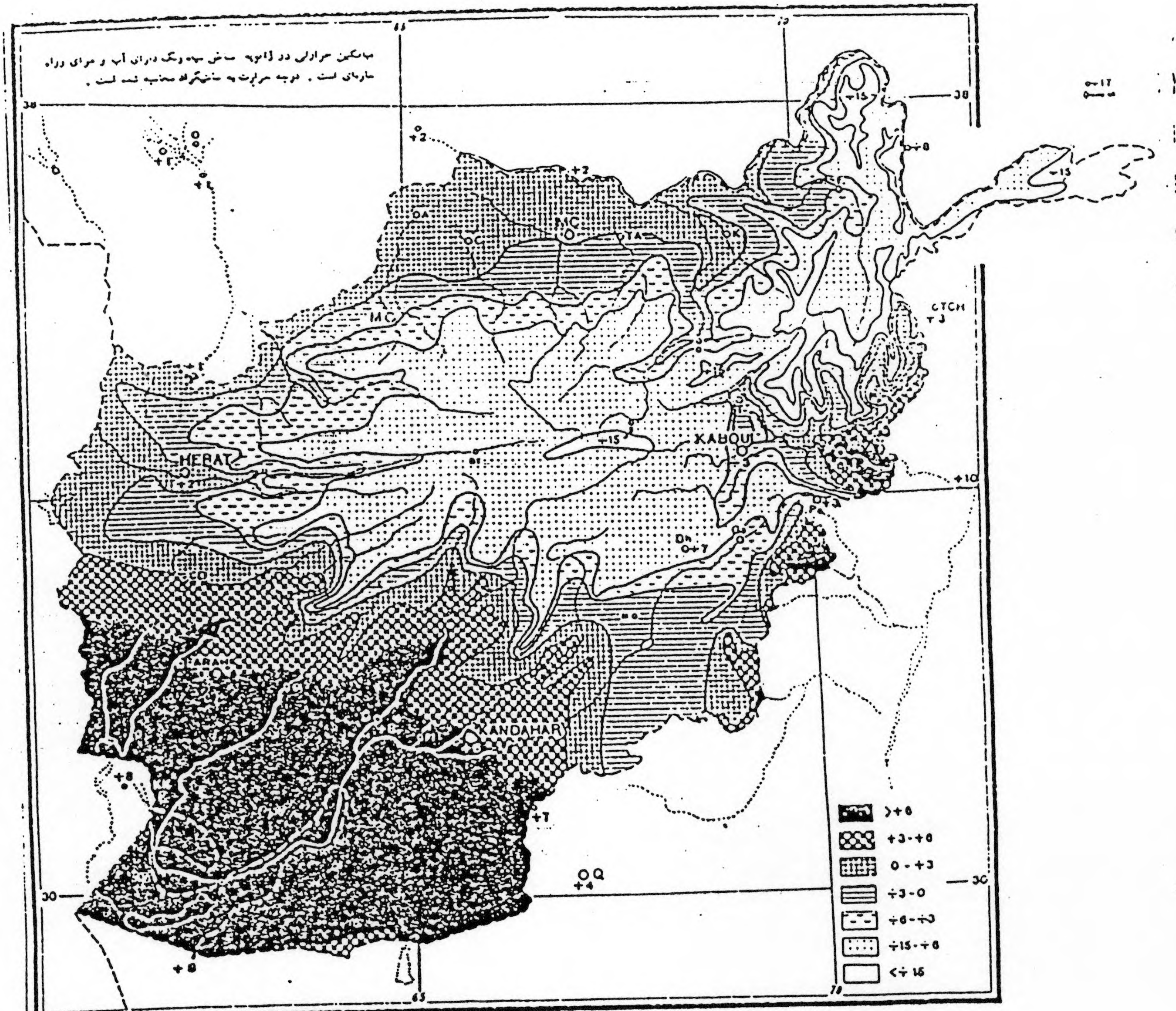


0-5 cm. | 5-10 cm. | 10-15 cm. | 15-20 cm. | 20-25 cm. | 25-30 cm. | 30-40 cm. | > 40 cm.

Map of the annual rainfall in Afghanistan

Carte de la quantité annuelle de pluie tombée en Afghanistan

Annex No. 3. Isotherms for Afghanistan (taken from General Atlas of Afghanistan, 1978).



Map of January isotherms

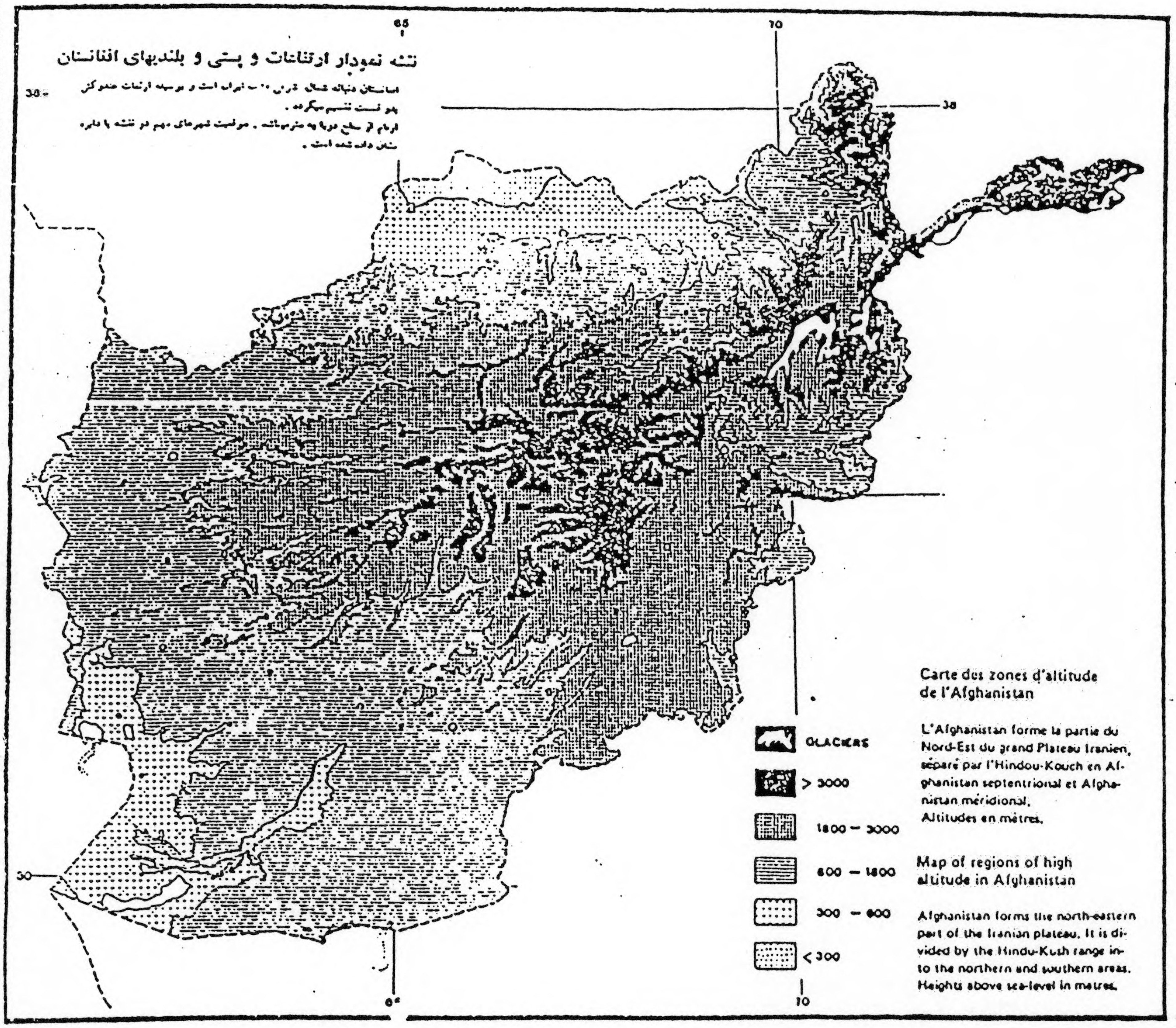
The black zones have a subtropical climate.

Carte des isothermes de janvier

Les zones noires ont un climat subtropical.

جدول درجه حرارت متوسط در ماههای ژانویه و ژولیه در برخی از

Annex No. 4. Isometric lines for elevation in Afghanistan (taken from General Atlas of Afghanistan, 1978).



Annex No. 5. Winter wheats suggested for possible cultivation and/or evaluation.

Variety	Origin	Status	Remarks
Bezostaya	Russia	Commercial Turkey	Widely adapted
Bolal	Turkey	Commercial Turkey	S.* to rust
Darulaman 2	Hungary	Unknown	S.[1] to rust
GKF 8001	Greece	Unknown	Needs evaluation
Kavkaz	Russia	Unknown	S.* to rust
Roussulka	Bulgaria	Unknown	Needs evaluation
Trakia	?	Unknown	Needs evaluation
WWP 4394	?	Unknown	Needs evaluation

*Known to be susceptible to one or more of the rust diseases; 1- Reported to be susceptible to one of the rust diseases.

Information taken from: CIMMYT, 1981; FAO, 1969; Hepworth, 1988; Khalidi, 1986; Skovmand and Braun, 1987.

Annex No. 6. List of important wheat diseases in Afghanistan.*

Disease	Distribution	Importance
Fungus:		
Stem rust	General	Major
Leaf rust	General	Minor
Stripe rust	General	Major
Common bunt	General	Major
Loose smut	General	Minor
Flag smut	Southeast, Central	Minor
Powder mildew	Southeast, Central	Minor
Tan spot	General	Minor
Spot blotch	General	Minor
Septoria tritici	General	Minor
Nematode:		
Seed gall	Southeast	Minor

*Based on reports listed in Annex No. 8.

Annex No. 7. The International Agricultural Research Centers and Wheat Production in Afghanistan.

The International Maize and Wheat Improvement Center (CIMMYT) has a long history of developing spring wheat germplasm. The early work concentrated on the autumn sown spring wheats for the developing countries because the dominant acreage was in this group. There are approximately 100 million hectares of wheat grown in the developing world. In rounded off figures, about 60 million hectares are spring bread wheat, 20 will be winter, 10 will be facultative and 10 will be sown to durum wheat (CIMMYT, 1987, Saari et al., 1988).

In the late 1960's a program to cross between the spring and winter types was started. The intent was to transfer desirable traits to each of the two isolated gene pools. The spring wheats have benefited the most from this effort because of the number of generations possible and a concentrated effort has been sustained to develop the material. A number of new varieties have been released from the CIMMYT spring by winter crossing program. The lines from the cross named as Veery have been especially well received. Cultivars have been released in some 25 countries, and these varieties now occupy some four million hectares (Diversity No. 16, 1988). The variety Pak 81 is an example. It was released in 1981 by Pakistan.

The winter wheats for developing countries have not received the same amount of sustained effort. As a consequence the progress achieved with the winter wheats has not been equivalent and this is even more pronounced for the facultative wheats. In order to address this imbalance, several programs have been promoted in more recent times. A cooperative program with Oregon State University and CIMMYT to develop winter wheats from the winter x spring wheat crossing program was started in the early 1970's.

A program with spring wheats and barley for low rainfall and cooler climates was initiated by the International Center for Research in Dry Areas (ICARDA) in the mid 1970's. ICARDA also started a breeding effort for high elevations for wheat and barley in the early 1980's. The ICARDA spring wheat program and CIMMYT's program became a joint program in 1983.

Introduction

Eugene E. Saari, a wheat specialist from the International Maize and Wheat Improvement Center (CIMMYT) based with the Turkey program was requested by Dr. Raymond E. Fort, the Representative of the Food and Agriculture Organization (FAO) of the United Nations, Islamabad, Pakistan to review the wheat variety recommendations for Afghanistan farmers and returning refugees. A two week assignment in Pakistan was started on April 9th and was completed on 23th, 1989.

The agenda and travel in Pakistan was arranged by Dr. John Stevens, FAO Consultant. Dr. Stevens accompanied me throughout. I wish to acknowledge his participation and assistance in this consultancy.

Main Findings and Conclusions

The war in Afghanistan has affected all facets of life. A number of organizations are concerned with this situation. It will remain fluid and make projections difficult. One of the major concerns for the Afghan people will be food.

Wheat is the basic and the most widely grown food crop in Afghanistan. A recent survey indicates that the war has caused a reduction in all aspects of the agriculture sector (Agriculture Survey of Afghanistan, 1988). The area sown to wheat has decreased, and the yields and production are much lower then before the war. Wheat seed stocks are depleted and those available are in a deteriorate condition. There will be a need to supply new stocks to farmers and returning refugees. Critical factors will be the kind, quantity and quality of the seed stocks. The synchronization of supply with demand will be difficult. However, it is safe to say, there is a need, demand will increase over time and it will be a sustained requirement (Fort, 1989; Hepworth, 1988).

As a first step to address the need for wheat seed, FAO and other organizations have arranged for approximately 5000 tons of seed. This seed was contracted, grown and is in the process of being procured and processed for the 1989-90 season. For details see the final report by John Stevens, FAO consultant Islamabad, 1989.

In 1984, CIMMYT initiated a winter wheat breeding program in cooperation with the Government of Turkey. The cooperative Turkey/CIMMYT program proposes to focus on the development of winter and facultative wheats for the developing countries of West Asia and North Africa (WANA). Germplasm has been accumulated from cooperators throughout the world. This material has been accessed and early generation hybrids from the best selections and the winter x spring program are under evaluation. This material should be of particular interest to the rainfed and higher elevation areas of Afghanistan.

The ICARDA/CIMMYT wheat breeding and barley breeding program located in Aleppo, Syria, CIMMYT's Mexico based program and the cooperative program in Turkey are potential sources of wheat and barley germplasm for Afghanistan and Pakistan. The cool areas requiring winter and facultative wheats would probably depend heavily on the Syria and Turkey germplasm as a source of new wheat varieties for the foreseeable future.

The cooler, higher elevations of Afghanistan and Pakistan could realize mutual benefits from the establishing of a network of trials that evaluates the germplasm for adaptation and resistance to local diseases.

ICARDA has expertise in food legumes and cropping systems research in this region. These are areas that will need address and the training of new and returning Afghan's could be facilitated by the involvement of ICARDA. Similarly, CIMMYT has the capacity of addressing maize research and training. This expertise and training capacity is available to the international community.

Annex No. 8. Selected references.

Anonymous. 1979. Afghan Agriculture in Figures. Central Statistics Office. Ministry of Planning. Kabul, Afghanistan.

Anonymous. 1969. Afghanistan. Information Bull., Near East Wheat and Barley Improvement Project, Jan.-April, 1969, Vol. 6, No. 1. Pg. 1-4. FAO Rome.

Braun, H-J and B.Skovmand. 1987. Trip Report - Afghanistan, 14 - 21 May 1987. Mimeographed, CIMMYT, Ankara, Turkey. 10 p.

CIMMYT. 1981. Commercial wheat, barley and triticale varieties and area in the RDTN cooperating countries from 1975 till 1981.

Fort, R.E. 1989. Afghan Agricultural Rehabilitation: Conceptual Frame Work and Proposed Strategy, Part 1. Mimeographed Paper. FAO, Islamabad, Pakistan. 11p.

Koehler, C.S., R.D. Wilcoxson, W.F. Mai and R.L. Zimdahl. 1972. Plant protection in Turkey, Iran, Afghanistan, and Pakistan. Report to the United States Agency for International Development, by the University of California at Berkeley. Contract No. AID/csd-3296. 82p.

Ghaffor, A. 1970. Wheat improvement and production programme in Afghanistan (1966-69). Proceed. Third FAO/Rockefeller Foundation Wheat Seminar. Ankara, Turkey, 29 April - 13 May 1970. FAO, Rome. pg.48-52.

Gattani, M.L. 1964. Plant diseases and their control. Report No. 1817. Project No. AFG/TE/PL. FAO, Rome. pg. 17-20.

Gul, A. 1988. The agricultural survey of Afghanistan. Mimeographed Report by the Swedish Committee for Afghanistan, Peshawar, Pakistan. 69p.

Hepworth, H. 1988. Wheat seed for Afghanistan. Mimeographed Report to the Office of United States AID, Islamabad, Pakistan, October 27, 1988.

Khalidi, G.A. 1986. Seminar Report, Turkey/CIMMYT Travelling Seminar, June 1986. CIMMYT, Ankara, Turkey. 15p.

Koehler, C.S., R.D. Wilcoxson, W.F. Mai and R.L. Zimdahl. 1972. Plant protection in Turkey, Iran, Afghanistan, and Pakistan. Report to the United States Agency for International Development, by the University of California at Berkeley. Contract No. AID/csd-3296. 82p.

Noory, M.A., M. Soofi and G.S. Ahmadi. 1974. Afghanistan. Proceed. Fourth FAO/Rockefeller Foundation Wheat Seminar. Tehran, Iran, 21 May - 2 June, 1973. FAO, Rome. pg. 54-55.

Osmanzai, M. and A. Quayoum. 1972. Afghanistan uniform wheat variety screening trial for bunt. Mimeographed Proceed. Regional Wheat Workshop, Beirut, Lebanon. February 14-17, 1972. The Ford Foundation. 5p.

Saari, E.E., H-J. Braun and B. Skovmand. 1988. Winter wheat germplasm improvement objectives for the Turkish-CIMMYT cooperative program. pg. 253-265. In Proceed. Winter Cereals and Food Legumes in Mountainous Areas. (Ed.) J.P. Srivastava, M.C. Saxena, S. Verma and M. Tahir. ICARDA, Aleppo, Syria. 317p.

Samim, S.M.S. 1969. Plant diseases found in Afghanistan. Technical Bull. No. 12. Faculty of Agriculture, Kabul University. pg. 96-107.

Annex 9. Schedule of activities and people/organizations met between April 8 and 23, 1989 in Pakistan.

8 April Saturday
Departed Ankara for Karachi, overnight

9 April Sunday
Travel: Islamabad overnight
Met :Dr. Raymond E. Fort, FAO Representative Pakistan
Dr. John Stevens, FAO Consultant
Dr. N.I. Hashmi, Wheat Coordinator, National Agricultural Research Center (NARC)

10 April Monday
Islamabad:
Met: Dr. Imtizaj Hussain, Agricultural Development Commissioner; Dr. Syed Irfan Ahmed, Director General, Federal Seed Certification Department; Dr. M. Hanif Quaz, Member Crop Sciences; Mr. Anne-Williem, Deputy Chief, UNHCR; Dr. B.C. Wright, Winrock International, Pakistan Agricultural Research Council (PARC)

11 April Tuesday
Drove: Pirsabak and Peshawar overnight
Pirsabak: Cereal Crops Research Institute (CCRI)
Met: Dr. Allauddin Khan, Director, CCRI, Pirsabak
Mr. S.A.A. Abidi, Wheat Breeder, CCRI
Mr. S.A.K. Khail, Plant Pathologist, CCRI
Mr. Inayat Ullah Khan, Federal Seed Certification
Dr. Azam Gul, Director Survey Project, Swedish Committee on Afghanistan
Selected head rows of basic seed for the varieties, Pak 81 and Khyber 87

Peshawar: Meeting at VITA
Met: Mr. David Gardner, Mr. John Tacon and Dr. Abdul Wakil

12 April Wednesday
Meeting at ACBAR with Agriculture Sub-committee;
Meetings at UNHCR, Swedish Committee and Medecins Du Monde
Drove: Islamabad overnight

13 April Thursday
Met: Dr. M. Yusuf Chaudhry, Director General, National Agricultural Research Council (NARC); Dr. Amir Mohammad,, Chairman, Pakistan Agricultural Research Council (PARC);

14 April Friday
Islamabad
Travel: Lahore overnight

15 April Saturday
Lahore and Okara area
Visit certified wheat seed fields in the Lahore area
Met: Dr. A. Rahman Khan, Cargill Seeds (Pvt) Ltd
Travel: Islamabad overnight

16 April Sunday
Islamabad overnight
Met: Turkish Ambassador; Mr. Abdul Hamid Chaudhry, Managing Director, Punjab Seed Corporation; Mr. Martin Barber, UN Coordinator, UNHCR

17 April Monday
Travel: Quetta overnight
Met: Dr. Sultan A. Aziz, Save the Children (USA)

18 April Tuesday
Quetta overnight
Met: Save the Children, Mr. Dan Fast and Mr. Myron Jespersen, Mercy Corps International
Dr. Sher Mohammad, Wheat Botanist, Provincial Agricultural Research Institute

19 April Wednesday
Quetta
Met: Dr. B Roidar Khan, Arid Zone Research Institute; Dr. David Reese and Dr. Cemal Talug, ICARDA
Travelled: Islamabad overnight

20 April Thursday
Drove: Peshawar
Met: SWABAC and ACBAR at UNHCR

Drove: Islamabad overnight
Met: Dr. Larry Crandall, Dr. Gary Lewis and Mr Andy Rude, US-AID, Islamabad

21 April Friday
Report writing

22 April Saturday
Report writing

23 April Sunday
Depart Islamabad

24 April Monday
Arrive Ankara

Immediate Considerations:

The majority of the wheat grown in Afghanistan is bread wheat with a small amount of durum wheat. There are three types of bread wheat which can be distinguished by their growth habit. Spring wheats are capable of continuous growth and do not need a cold period to induce flowering. Winter wheats require an extended cold period before they will bolt and flower, and they are resistant to cold or freeze damage. Facultative wheats have a minimal requirement for cold to flower, but they have a relatively high tolerance to cold. The distinctions between the three groups has not always been clear. The two dominant types are the spring and winter, while the facultative wheats represent a much smaller group. It is now recognized that there can be continuous variation between the groups.

Confusion arises when the terminology for the type of wheat is used and mixed with discussions regarding the time of sowing. Winter and spring types can be autumn or fall sown. The cold requirement and winter killing are the two factors that will determine the limits of which type can be grown. Facultative wheats are more flexible when the conditions are varying between the extremes.

In the developing world, spring wheats, autumn sown predominate. Sometimes they are referred to as winter wheats, or winter cereals. This type of terminology use can be confusing. Afghanistan grows all three types of wheat. Most of the wheat is autumn sown. The area sown in the spring time, i.e. March, is minor and confined to higher elevations with more favorable rainfall patterns or where supplemental irrigation is available. The dominance of autumn sown wheat is dictated by the winter rainfall pattern that prevails over most of Afghanistan and the temperatures associated with the altitude (See Annexes 1 and 2 taken from General Atlas of Afghanistan, 1978). In Figure 1, below a generalized but simplified summary of the types of wheat and the characteristics that distinguish them is presented.

Table 1. A simplified summary of wheat growth habit, the distinguishing characteristics, responses, and relationship to sowing times in Afghanistan.

Character	Growth habit (wheat type) and characteristic response: Winter	Facultative	Spring
Cold	Required	Tolerant	Not-required
Freeze	Hardy	Tolerant	Sensitive
Sowing time	Sept/Oct	Nov/Feb	Mar/Apr or autumn.
Germination	Sept-Nov	Nov-Mar	Mar-Apr
Harvest time	May-July	May-Sept	July-Sept

At the higher elevations winter wheats will be required because of the low temperature that prevail for an extended period of time. The occurrence of freezing or below freezing temperature for extended periods is sufficient to vernalize most winter wheats. It will be too cold for autumn sown spring wheats and they would be in danger of winter killing. At the lower altitudes true winter wheats will not receive enough cold exposure and they remain vegetative, producing little or no seed. The facultative wheats are generally sown late in the year and they either germinate just before the on set of cold temperatures or germinate in the spring. Their cold requirement is easily satisfied, but they are relatively resistant to winter killing.

It is difficult to give precise acreage figures for the different types of wheat grown or the altitudes at which they are grown. Earlier figures place the total wheat area at about 2.3 million hectares (Afghan Agriculture in Figures, 1978; Hanson, et al., 1882; Ghaffor, 1970). Estimates for the area sown to winter wheats varies from 10 to 20% of the total wheat area (Hepworth, 1988; personal experience and discussions with knowledgeable persons, 1989).

Elevation will determine to a great extent the limits for the winter and spring wheats. From the weather data available, the winter wheats are grown at the higher elevations somewhere between 1500 and 2000 meters. It appears the isometry of 1800 meters and above provides a reasonable fit with the isotherms for severe and/or extended freezing temperatures (See Annexes 3 and 4). It appears that the majority of the winter wheat acreage probably lies in the areas near 1800 meters and above.

Of the total wheat area approximately half or more and up to 1.3 million hectares was irrigated before the war, with the remaining one million grown under rainfed conditions. The rainfed crop is cultivated under low moisture conditions, usually less than 400 mm of winter precipitation. Average yields for wheat have been quoted at between 1.0 and 1.3 tons per hectare depending upon the authority. In local terms it means 29 and 37 seers per jerib, respectively (1 seer/jerib = 35 kg/ha).

The Agricultural Survey of Afghanistan (1988) indicates that the cropped area has decreased by more then 30%. In addition, the average yields for wheat have declined. It has been calculated that yields in the rainfed and irrigated areas have decreased by some 26% and 25%, respectively.

The availability of suitable varieties or cultivars that can be grown in the different regions of Afghanistan is an issue. Based on historical information, some recent but limited data, and experience in and around Afghanistan, the following varieties can be considered as the best alternatives available in commercial quantities.

Table 2. Situation and cultivars available in commercial quantities.

Elevation	Irrigated	Rainfed <400mm	Rainfed >400mm	R+I*
Autumn sown [1]				
Lower elevations: <1800 meters	Pak 81 Seri 82	Local	Pak 81 Seri 82	
High elevations: >1800 meters	Bezostaya	Local Zarg-hoon 79	Bezostaya	
Spring sown [2]				
Higher elevations:	Sonalika/ Blue Silver			

* There is a limited rainfed area that uses supplemental irrigation and these should be treated like irrigated areas.
1), 2) See Table 1.

Pak 81 and Seri 82 are sister lines available in commercial quantities. Pak 81 is available in Pakistan and Seri 82 is available from several places. It is a major variety in Spain and should be available either by direct purchase or contract. Turkey has only recently released Seri 82 so larger commercial quantities are not readily available. However, if the private sector were approached, or maybe even the Turkey State Farms, it might be possible to contract for seed of this variety. Similar situations occur in Egypt and Syria. Seri 82 was a commercial variety in Mexico, and it probably could be purchased there. However, the shipping costs from that distance would have to be considered.

The above varieties are based on CIMMYT germplasm, and they will grow wherever Mexipak has done well. They are also resistant to the rust diseases which are of major importance in Afghanistan. There seem to be several options for large scale purchase or contract production for the spring type autumn sown wheats.

The variety Zarghoon 79 is mentioned as an alternative for local land race varieties although the availability of seed is limited to farm level purchases in Baluchistan. It is a variety developed in Baluchistan from the CIMMYT spring winter germplasm. It has some cold tolerance and has done well at the higher elevations when sown at the later dates (November/December). It appears to behave more as a facultative wheat. In some experiments it was sown early (September) with irrigation. This caused it to head early in December resulting in freeze damage at grain development. The early sowing of this variety must be avoided. No other commercial facultative wheat is known to be available. There are some varieties in Turkey that could be considered but their disease response to Afghan races of rust is not known. Before they can be recommended additional testing will be required.

Bezostaya is a Russian winter wheat which was released in Afghanistan about 15 years ago. It has adequate yield potential, good winter hardiness, reasonable yield stability and a moderate level of disease resistance. It was replaced by better yielding varieties which subsequently became susceptible to the rust diseases. It, however, remains as one of the most widely grown winter wheat varieties in Turkey. Both basic and certified seed should be readily available from either the Ministry of Agriculture and Rural Affairs, Government of Turkey or the private sector. Another possible source of Bezostaya could be Russia, but whether the variety is still available in quantity would need to be determined.

There are two features that will limited the popularity of Bezostaya in Afghanistan, when and if other varieties become available. It is a beardless (awnless) variety and if birds are a problem they tend to focus on the beardless before attacking the bearded wheats. If all the varieties of the area are the same then the spread of damage is also distributed evenly. The second characteristic is red grain. Although Bezostaya is a good quality wheat in terms of making bread and nan, the use of whole wheat atta (flour) results in a brownish or dark nan. This is a quality factor of some significance in this part of the world.

There have been a number of other winter wheats identified as possible candidates for use at the higher elevations by Hepworth (1988) and others (Braun and Skovmand , 1987; Hepworth, 1988; Khalidi, 1986). A list of these varieties are given in Annex 5. Some of these varieties are now either susceptible to disease or are no longer grown commercially.

Martonvasar 2, for example, was released and renamed as Darulaman 2 about 1978. However, recent reports indicate that it is now susceptible to the rust diseases (Khalidi,G.A., 1986.). Before this variety or any other commercial varieties are purchased or multiplied, an assessment of their performance should be required.

There are a number of spring type wheat varieties based on CIMMYT germplasm that have been identified as potentially useful for Afghanistan. They have received sufficient testing in and around the region that they can be recommended with a high level of confidence. These materials represent the next generation of varieties. Seed is available in relatively small quantities. An organized effort will be required to maximize their increase so maximum benefit can be achieved. The prospect of using the summer nursery or high elevation locations to multiply seed this summer (1989) should be considered, particularly for those varieties where seed availability is less then one ton. These promising varieties have been summarized in Table 3.

The small area of wheat sown in March can be satisfied by early maturing or short cycle wheats which will escape terminal drought stress (some farmers may sow as early as February and as late as April). The two varieties are known as Sonalika in India and Blue Silver in Pakistan and they are basically the same. Khyber 87 is a new replacement variety with better disease resistance. It can also be used in the autumn sowings at lower elevations. Under these situations it is especially useful when late sowing (December) occurs.

Table 3. Promising varieties for Afghanistan that should receive attention for multiplication.

Elevation	Irrigated	Rainfed <400mm	Rainfed >400mm	R+I*
Autumn sown [1]				
Lower elevations: <1800 meters	Pirsabak 85 Khyber 87		Pirsabak 85 Khyber 87	
High elevations: >1800 meters		Zarg-hoon 79		
Spring sown [2]				
Higher elevations:	Khyber 87			

* There is a limited rainfed area that uses supplemental irrigation and these should be treated like irrigated areas.
1), 2) See Table 1.

The list above illustrates the value of wide scale testing and adaptation. It also highlights the possibilities of establishing a network for varietal testing using agroclimatic areas of Pakistan that correspond to areas in Afghanistan. Such a network could provide advanced information on varietal performance. It would be possible to expanded the network into Afghanistan as rapidly as it could be assimilated. It would serve as a staging program for returning Afghan scientists, provide materials and training opportunities for young scientists coming into the pool.

There are new advance generation wheat lines which appear promising, but their adaptation and disease resistance needs to be evaluated in and around Afghanistan. Since Afghanistan is one of the centers of origin for wheat, it also possess an indigenous population of wheat diseases and pests. The diseases of wheat tend to be more important, on the average, then insects. They can become epidemic on occasion and cause substantial losses.

Under Afghanistan conditions the only realistic method for control of the diseases like the rusts has been through the use of resistant varieties. The recommendation of varieties must take this into consideration. Insect outbreaks must still be regulated by chemical means. A summary of the more important wheat diseases in Afghanistan is given in Annex 6.

The procurement and distribution of wheat seed for the 1989-90 season is under a tight calender constraint. This point needs to be stressed and clearly appreciated as many concerned individuals and organizations do not fully understand the limits of the biological and agriculture clock.

To obtain minimal quantities of seed, process and deliver them to targeted areas within Afghanistan will require immediate action. The higher elevations are sown usually in the months of September or October. The lower irrigated elevations will be sown, ideally, in November. Some of the dryland sites may be sown at a slightly later date depending upon the arrival of autumn or winter rains/snow (See Table 1).

Quality seed will be an important factor in the re-establishment of agriculture. The correct variety insures possibilities for success and protects, to some extent, against the potential of epidemic diseases. Good certified seed guarantees the variety and also provides a warranty on the levels of: 1) seed germination, 2) the number of broken and inviable seeds, 3) weed seed contamination, and 4) the diseases that are known to be seed borne. The seeding rate of good quality seed can be reduced from that normally practised by farmers. In situations where local seed is used, the local seed rate should be encouraged. It is the only method for compensating for the deteriorated condition of the seed stocks.

The package of technology must also be given full consideration. The value of the quality seed will not be fully realized unless fertilizer is part of the total package. The two, together, provide gains that neither one can achieve alone. This is especially true on the irrigated acreage.

Shelf

E E Saari

402

REPORT TO FAO REPRESENTATIVE, ISLAMABAD, PAKISTAN

WHEAT VARIETIES FOR AFGHANISTAN,

PREPARED BY EUGENE E. SAARI, CIMMYT, WHEAT PROGRAM,

PK.39, EMEK, ANKARA, TURKEY

MAY 5, 1989

Summary of Recommendations

There is need to supply new wheat seed stocks to the Afghanistan farmers and returning refugees. Current stocks are depleted or in a deteriorated condition.

- The recommendation of a suitable variety, and its availability in quantity and quality is an issue.

- In the most simple terms, the majority Afghanistan's wheat acreage can be divided into four major areas.

- More than half of the wheat acreage, before the war, was irrigated with the remainder being grown under rainfed conditions with less than 400 mm of rain per year.

- The majority of the wheat is sown in the autumn and only a small proportion is sown in the spring time due the rainfall patterns and temperatures.

- Winter wheats resistant to freezing will be required for the irrigated higher elevations. Autumn sown spring wheats will be required for the irrigated areas at the lower elevations. Facultative types are the most suited for the rainfed areas.

- The variety Bezostaya is an established winter wheat variety that has good yield, winter hardiness, stability and adequate levels of disease resistance. It is recommended for the irrigated areas at higher elevations (>1800meters).

- The varieties Pak 81 and Seri 82 are sister selections that can be recommended for the irrigated areas at lower elevations (<1800 meters).

- For the rainfed areas no released varieties are available in quantity for the higher and lower elevations. Local varieties will have to be used.

- The variety Zarghoon 79 from Baluchistan should be considered for the high elevations rainfed situation.

- Time is short for the procurement, processing and and distribution of seed if it is to be sown this autumn. At the high elevations, farmers must sow in September. Immediate action is needed.

- Other inputs are required to maximize the benefits of the seed to be distributed. Fertilizer and seed treatment must be organized.

- Distribution inside of Afghanistan will require a commitment for transportation. This needs attention if it is to meet deadlines for sowing.

- Two promising varieties, Pirsabak 85 and Khyber 87, need to be multiplied for future distribution at the lower elevation irrigated conditions.

- There is a need to identify new varieties for the rainfed and higher elevation conditions. A testing network for exotic germplasm from ICARDA and CIMMYT should be initiated.

- The needs for Afghanistan wheat seed appears to fall into three categories. There is the immediate need which requires recommended varieties that can be used and are readily available. The second phase is to organize a multiplication of the new varieties which are in short supply. The third phase is to initiate a program for the evaluation of new germplasm which will satisfy missing needs and fulfil future requirements.